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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Wolfgang Rohde et al.

: Group Art Unit: 1793

Ser. No. 10/538,536

: Examiner: Cam Nguyen

Filed: June 10, 2005

For: SUPPORTED CHROMIUM CATALYST AND ITS USE FOR PREPARING
HOMOPOLYMERS AND COPOLYMERS OF ETHYLENE

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF UNDER 37 C.F.R. § 41.37

Sir:

Please enter the following Brief in response to the final Office action mailed December 9, 2008. Appellants filed a Notice of Appeal on April 7, 2009. The Office has been authorized to charge Deposit Account No. 08-2336 for the requisite fee for this Brief.

I. Real Party in Interest

The real party in interest for the application is Basell Polyolefine GmbH, Bruhler Strasse 60, 50389 Wesseling, Germany, a company of LyondellBasell Industries, with headquarters at P.O. Box 2416, 3000 CK Rotterdam, The Netherlands.

II. Related Appeals and Interferences

There are no other prior or pending appeals, interferences, or judicial proceedings known to Appellants, Appellants' legal representative, or the assignee which may relate to, directly affect, or be directly affected by or have a bearing on the Board's decision in this appeal.

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III. Status of Claims

Claims 1-10 stand rejected and are being appealed.

IV. Status of Amendments

No amendment was filed subsequent to the final rejection.

V. Summary of Claimed Subject Matter

Appellants claim a process for preparing supported, titanized chromium catalysts (claims 1-6 and 10), catalysts made by the process (claim 7), and olefin polymerization processes that use the catalysts (claims 8 and 9). The process requires, in a single step, contacting a support material with a protic medium having a water content less than 20% by weight and comprising titanium and chromium compounds (claim 1). Optionally, the protic medium is removed, and the resulting precatalyst is calcined and activated by heating it in an oxygen-containing atmosphere (claim 1). Phillips catalysts made by the process are particularly valuable for gas-phase olefin polymerizations, where they provide high productivity and polymers with excellent morphology and good processability; additionally, the catalysts provide good comonomer incorporation and are productive at low activation temperatures (see U.S. Pat. Appl. Publ. No. 2006/0063666, hereinafter also "the '666 publication," at paragraph [0084]).

VI. Grounds of Rejection to be Reviewed on Appeal

1. The only issue is whether or not McDaniel (U.S. Pat. No. 4,301,034) anticipates Appellants' claims 1-10 under 35 U.S.C. § 102(b).

VII. Argument

McDaniel Fails to Anticipate Appellants' Claimed Process for Preparing Supported, Titanized Chromium Catalysts

Anticipation requires a reference to teach each and every claimed element. There can be no differences between the claimed invention and the reference disclosure. The Board should reverse the Section 102(b) rejection based on McDaniel because the reference fails to teach important requirements of Appellants' claimed process. First, McDaniel describes how to form a silica support rather than how to combine Ti and Cr components with an already-prepared support material. Second, McDaniel adds Ti and Cr components

sequentially to a liquid mixture rather than in a single step to an already-prepared solid support. In sum, only Appellants contact, in a single step, a support material and a protic medium having less than 20 wt.% water and comprising a Ti and a Cr component.

A. McDaniel Forms a Silica Support while Making Catalysts and Does Not Add Ti or Cr Components to a Support Material

Appellants' claims require starting with a "support material." Suitable support materials and ways to prepare them are well defined in paragraphs [0019] through [0039] of the '666 publication. It is apparent from this description that an already-prepared support is a required element of Appellants' claims. The support material is "in particular, an inorganic solid, which is usually porous." Appellants combine the support material with the protic medium containing Ti and Cr components to make the supported catalyst.

In contrast, McDaniel's whole focus is on how to *form* gelled silica compositions by controlled hydrolysis of silicate esters. Numerous examples explain how to form and recover silicas from aqueous silicate solutions. McDaniel describes how to form silicas either in the absence of metals (Silicas C₁, C₂, D, and E, cols. 8-9) or in the presence of metals (Catalysts A and B, cols. 7-8). Importantly, at the time Ti or Cr is introduced, no "support material" has yet been made.

The preparation of McDaniel's Catalyst A is illustrative and merits a closer look. Tetraorthosilicate is hydrolyzed with water, concentrated sulfuric acid, and 2-butanol to produce a silica mixture (col. 7, ll. 21-26). Just before adding the titanium reagent, McDaniel notes that "gelation has not yet occurred" (col. 7, ll. 50-51). In other words, there is no support material formed yet. Titanium tetraisopropoxide and water are added, followed later by chromium(III) acetate solution in methanol (col. 7, ll. 52-58). Still, no support material has formed. After boiling the mixture and stirring for 30 minutes to encourage particle growth, heating is discontinued and "sufficient ammonia gas was passed into the mixture to form the tergel (gelation)" (col. 7, ll. 61-62). This mixture still requires neutralization (with concentrated ammonium hydroxide), water removal through

azeotropic distillation, filtration, vacuum drying, and calcination (col. 7, l. 62 through col. 8., l. 15) to finally provide a solid support material comprising Ti and Cr. In contrast, Appellants' compositions are useful as catalysts after evaporation of the protic medium and heat activation.

The Examiner highlighted the passages at McDaniel's col. 2, ll. 11-14 and col. 5, ll. 37-43. Interestingly, however, these excerpts confirm that no support material has yet been formed at the time the soluble Ti and/or Cr components are introduced. In fact, the quoted text from column 2 begins: "Prior to gelling the silica" The text at column 5 also emphasizes that the titanium and chromium components are introduced "before gelation" (ll. 42-43).

In sum, McDaniel does not add Cr or Ti components to a "support material" because the Cr and Ti are added, if at all, during the formation of the support. On the other hand, Appellants' claims require that the support material be provided prior to its combination with Cr and Ti components. The Board should reverse the Section 102(b) rejection because McDaniel fails to disclose contacting a "support material" with a protic mixture comprising Ti and Cr components.

B. McDaniel Adds Ti and Cr Components Sequentially During Formation of a Silica Support Rather Than in a Single Step After Preparation of the Support

Appellants amended their claims to require combining "in a single step" a support material and a protic medium having less than 20 weight percent of water and comprising a Ti component and a Cr component. Example 1 of the '666 publication shows how to do this. Support material, e.g., dry spherical xerogel particles having a diameter from 40 to 300 microns, is first produced and isolated. The "protic mixture" is formed by adding titanium isopropoxide to a solution of chromium(III) nitrate nonahydrate in methanol. The xerogel particles are added to this Cr/Ti mixture to deliver both Cr and Ti components to the support material in "a single step."

McDaniel fails to meet the single step requirement for two reasons. First, as is explained above, McDaniel does not provide a support material to combine

with the other components, so it is illogical to talk about whether or not it does so sequentially or in a single step.

Second, even if we assume that McDaniel's non-gelled liquid mixture is somehow a "support material" as contemplated by Appellants, the reference teachings are more consistent with *sequential* addition of Ti and Cr components rather than combination in a single step. For example, at col. 5, ll. 43-45, McDaniel teaches: "it is preferred to add the titanium compound before the chromium compound." Col. 6, ll. 19-23 is also explicit: "Most preferably an alcohol soluble titanium compound is introduced after hydrolysis, then particle growth is carried out and then a water soluble chromium compound is added after which gelation is carried out." Thus, if anything, McDaniel prefers to combine the Ti and Cr components sequentially.

The Board should reverse the Section 102(b) rejection because McDaniel fails to teach a process in which a support material is combined in a single step with a protic medium that comprises Ti and Cr components.

VIII. Conclusion

Appellants respectfully ask the Board of Appeals and Interferences to reconsider and reverse the Section 102(b) rejection based on McDaniel.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail, with sufficient postage, in an envelope addressed to: Commissioner for Patents, P.O. Box. 1450, Alexandria, VA 22313-1450 on May 19, 2009.

Jonathan L. Schuchardt
Name of person signing

Jonathan L. Schuchardt
Signature

Respectfully submitted,
Wolfgang Rohde et al.

By: Jonathan L. Schuchardt

Jonathan L. Schuchardt
Reg. No. 34,428
Attorney for Applicant(s)
LyondellBasell Industries
3801 West Chester Pike
Newtown Square, PA 19073
Phone (610) 359-2276
Customer Number 24114
May 19, 2009

VIII. Claims Appendix

1. A process for preparing supported, titanized chromium catalysts, which comprises the following steps:

A) in a single step, bringing a support material into contact with a protic medium having a water content less than 20% by weight and comprising a titanium compound and a chromium compound;

B) optionally, removing the protic medium, thereby forming a precatalyst;

C) optionally, calcining the precatalyst obtained after step B); and

D) optionally, activating the precatalyst obtained after step B) or C) in an oxygen-containing atmosphere at from 400°C to 1100°C.

2. The process as claimed in claim 1, wherein the support material is a silica gel.

3. The process as claimed in claim 1, wherein the chromium compound is an inorganic chromium compound.

4. The process as claimed in claim 3, wherein the inorganic chromium compound is chromium(III) nitrate nonahydrate.

5. The process as claimed in claim 1, wherein the titanium compound is titanium tetraisopropoxide, titanium tetra-n-butoxide or a mixture thereof.

6. The process as claimed in claim 1, wherein the protic medium is methanol.

7. A catalyst system obtained by a process comprising:

A) in a single step, bringing a support material into contact with a protic medium having a water content less than 20% by weight and comprising a titanium compound and a chromium compound;

B) optionally, removing the protic medium, thereby forming a precatalyst;

C) optionally, calcining the precatalyst obtained after step B); and

D) optionally, activating the precatalyst obtained after step B) or C) in an oxygen-containing atmosphere at from 400°C to 1100°C.

8. A process for preparing polyolefins comprising polymerizing or copolymerizing olefins in presence of a catalyst system obtained by a process comprising:

A) in a single step, bringing a support material into contact with a protic medium having a water content less than 20% by weight and comprising a titanium compound and a chromium compound;

B) optionally, removing the protic medium, thereby forming a precatalyst;

C) optionally, calcining the precatalyst obtained after step B); and

D) optionally, activating the precatalyst obtained after step B) or C) in an oxygen-containing atmosphere at from 400°C to 1100°C.

9. The process as claimed in claim 8, wherein ethylene or a monomer mixture comprising at least 50 mol% of ethylene and at least one C₃-C₁₂-1-alkene is used for preparing the polyolefins.

10. The process as claimed in claim 1, wherein the support material is a silica xerogel.

IX. Evidence Appendix

Not applicable

X. Related Proceedings Appendix

Not applicable